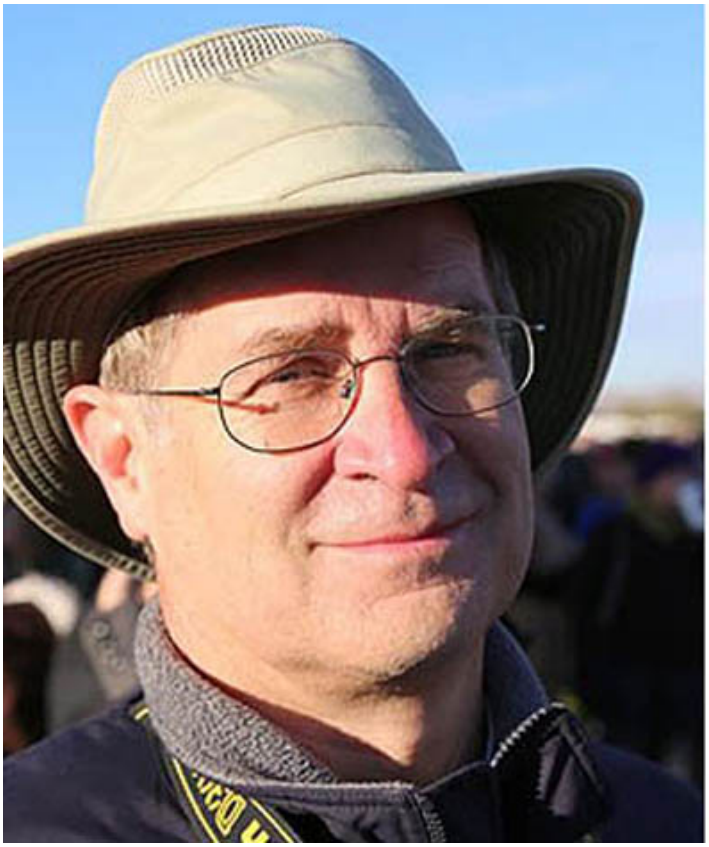
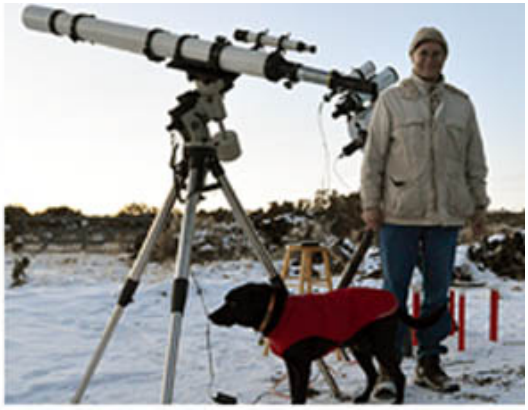
Glen Wurden

February 18, 2015





What you can see from your driveway

On the dark, moonless evening of January 26, 2015, the Physics Division's Glen Wurden stands in his driveway admiring the distant stars above Los Alamos, his 11-year-old, jet-black dog Java as always beside him. Wurden owns several powerful telescopes that allow him to see 30 million light-years or deeper into space. Since one light-year (the distance that light travels in one year) translates to about 10 trillion kilometers (six trillion miles), this means that on any given night Wurden can marvel at celestial objects about 300 trillion kilometers (180 million trillion—or 180 quintillion—miles) from his house.

"Java likes to sit next to the telescopes," Wurden explains, "but under a piñon tree, where the ground is soft, not on the gravel. I observe the sky, while he observes everything else."

During this particular session, Wurden is keeping an eye out for Asteroid 2004 BL86. Wurden quickly checks the asteroid's reported location and speed on the computer in his study, estimates the coordinates three minutes into the future, then darts out into the driveway, punches the results into one of his telescopes and swings it into position. But the high-power telescope reveals nothing except stars until Wurden finally spots a tiny streak in the lower corner of the wider-view second scope as Asteroid 2004 BL86 flashes through space only 1.3 million kilometers from Earth, next to the Beehive Cluster (see Wurden's brief video below).

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Asteroid 2004 BL86

"It's amazing what you can see from your driveway," Wurden says, "and how beautiful and fascinating space is. Through even a small telescope with a camera, startlingly majestic galaxies, nebulae and planets seem as close as your hand, yet what we are actually watching is history. You are not seeing the celestial objects as they are now, but as they were when the light we see left their photospheres a long, long time ago. When you look at the Andromeda Galaxy, for instance, you see it as it was two-and-a-half million years ago. The largest telescopes we have can even take us back billions of years to galaxies in their infancy."

But watching the heavens from the convenience and safety of one's driveway is not always as undisturbed and peaceful as one may wish. "Java gets excited when coyotes are nearby," Wurden notes, "and one night I got excited, too, when something big was coming toward us in the pitch-dark of 2 a.m. When Java and I realized that it was a giant bull elk, we thought it would be wise to retreat to the garage."

Saving the planet

Ever since fragments of the comet Shoemaker-Levy 9 repeatedly crashed into Jupiter in 1994, Wurden has pondered threats bigger and more dangerous than bull elks while he's gazing at the firmament.

"Professional and amateur stargazers are quite aware that comets, asteroids and meteors can and do slam into Earth as well, often with dramatic effect," Wurden says. "We have a lot of scientific agreement, for example, that an asteroid or comet caused the extinction of the dinosaurs 65 million years ago, and we know that a far smaller asteroid leveled 80 million trees in Tunguska, Siberia, in 1908. In 2013, the meteor that luckily exploded over, not in, Chelyabinsk, Siberia, injured nearly 1,500 people. On the very same day, a roughly Tunguska-sized asteroid, 2012 DA14, raced between the Earth and some of our satellites."

Comet Lovejoy (C/2014 Q2), discovered August 2014 and visible to the naked eye around mid-December 2014.

In 1998, NASA set out to find and track 90 percent of asteroids greater than one kilometer in size, but that leaves at least 10 percent of the possible asteroids unaccounted for, and the Tunguska asteroid is thought to have been less than a third the size of the smallest asteroid targeted in NASA's 1998 survey.

"In 2005, Congress asked NASA to locate 90 percent of all asteroids 140 meters or larger by 2020," Wurden recalls, "yet even if we catalog most of them, it is the unknown, never-before-seen cosmic bodies, inbound for the first time in recorded history, that I am still worried about. In any case, what are we going to do about the ones that have the potential to strike Earth, and will we have enough time to prevent a catastrophe? The Chelyabinsk meteor, coming out of the daytime skies, caught scientists completely by surprise."

If we discover a celestial threat heading toward us on an intersecting path, Wurden suggests, we need to alter its orbit to insure that it misses Earth.

"People have thought of several potential options," Wurden says. "I can't speak for the Lab, but in my own personal opinion the most effective method would be to use nuclear explosives to ablate a thin layer of the object, causing a small rocket effect that slightly changes the intruder's direction. The farther away we can do this, the better."

The logistics of the selected solution will have to be carefully planned, engineered and tested, but such preparations are difficult if not impossible given the current state of awareness and funding commitments.

"At present, we'll need at least a decade or two advance notice to begin getting ready," Wurden explains, "ideally including doing trial runs on asteroids that don't matter."

But on this lovely evening, Wurden and Java are tired and haul the telescopes and 100-foot extension cord back to the house.

Wurden works for the Physics Division's Plasma Physics group.

Disclaimer: The views and opinions expressed in the Employee Spotlight articles are solely those of the featured employees and do not necessarily reflect the official policy or position of Los Alamos National Laboratory.

Resources

- Astronomy Picture of the Day (NASA)
- Curious About Astronomy? (Cornell University page explaining comets, asteroids and meteors)
- Space Weather (Space news, info, astrophotography)
- The Sky Live (Up-to-date sky charts)

For the "Saving the planet" section, you might consider watching the PBS video Asteroid: Doomsday or Payday? (part of the NOVA series).

To convert metric units such as kilometers and meters, which astronomers and other scientists use, into U.S. customary units such as miles and feet, check the Convert Length and Distance Units Instantly web page.